

*Scotland*

# CONSIDERATIONS

UPON

## The intended NAVIGABLE COMMUNICATION between the Friths of FORTH and CLYDE.

In a Letter to the Lord Provost of Edinburgh, Preses of the General Convention of the Royal Boroughs of Scotland, from a Member of the Convention.

My LORD,

*Edinburgh, April 11. 1767.*

**I**N obedience to your Lordship's commands, I hereby offer to you, and to the public, what occurs to me respecting the navigable communication betwixt the friths of Forth and Clyde, which is at present so much the subject of public attention in this country.

This communication has long been the object of national wishes. In the year 1763, the Honourable Board of Trustees for the promoting of Fisheries, Manufactures, and Improvements, had the track for it surveyed and planned by Mr John Smeaton, an able engineer.

An estimate was made by him of the expence it would cost to join the rivers Carron and Clyde, by a canal navigable for vessels of at least forty tuns burden, to enter at Carron-shore, and terminate at the barns of Clyde, about six miles below Glasgow; which estimate amounts to about L. 80,000.

It was hoped here that this public navigation would have been executed by the government, or at least that it would have given a considerable aid thereto. Whether this has been prevented hitherto by the frequent changes of late in administration, or from what other causes, I will not pretend to determine.

Some spirited gentlemen, traders in Glasgow and at Carron, sensible of the high importance of a water-communication be-

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ween the two friths, and wearied with the delay, or despairing of the execution of it by the public, formed a scheme for a small canal, to be executed by private subscription.

This canal is proposed to be navigable only by lighters, and to join the Clyde at Glasgow; and a bill is now depending in parliament for that purpose, which those concerned in it are endeavouring to carry through with the utmost expedition.

I have never upon any occasion opposed either road, bridge, or harbour; but on the contrary, sensible of the great importance of such communications in a country situated like ours, I have promoted them whenever it was in my power.

When the scheme of this little canal was first set on foot, I heartily approved of it, and did contribute what I could with several persons of influence for carrying it forward. I do think this country greatly obliged to the active spirit of the gentlemen chiefly concerned for engaging in that undertaking, and in many former schemes, much for the advantage of Scotland. I heartily wish them an adequate return for their risks and labour; and I flatter myself none of them can take amiss what I am now to throw out, with a sincere desire to promote the public good only, and from no view to any local or private interest.

If I assert any thing on wrong information, or am mistaken in any facts or calculations, I hope to be excused; since I can assure your Lordship, that I will make no wilful errors, or deductions with a view to mislead in this question.

When I was so desirous of promoting this small navigation, it was on the supposition that no better could be obtained, and believing that any canal was better than none. For, being much occupied with private concerns, I must confess with shame and regret, that I had never looked into Mr Smeaton's plan and estimate till about fourteen days ago: but since reading the first page of it, I could never hear of the small canal with patience.

In the first paragraph, my Lord, of his report, I found these very remarkable words. "The great utility of a navigable communication between the east sea and the west, has given occasion to the forming of several projects for this purpose in different parts of the kingdom of Great Britain; the principal of which are, the Thames and Severn, the Trent and Severn, the Trent and Weaver, the Calder and Mersey, and the Forth and Clyde. *But from what I have seen and heard of these matters,*

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" I am well convinced, that by far the most easy to be accomplished, not only in point of distance, but in point of perpendicular height, is the last." Again, p. 12. and 13. he writes as follows. " With a view to determine the kind of vessels proper to navigate this canal, I examined the gabots (or galberts) which ply upon the Clyde, and are capable of navigating that frith in all common seasons, and which I apprehend by the same rule would navigate the frith of Forth between the canal and Leith, if found requisite so to do. I found that a middling gabot, of fifty-six feet long, stem and stern, seventeen feet and a half wide, and drawing four feet water, will carry *at least forty tuns*; and this I look upon to be the largest size that will be convenient for an artificial navigation."

In same page 13. Mr Smeaton says, That the canal will have water enough to carry 208,000 tuns of shipping *per annum*. And p. 16. " There is all possible certainty that the canal will be amply supplied with water from end to end." Pag. 29. he says, The passage may be performed in four days of twelve hours; so that in the middle of summer it may be crossed in two days, between the two seas. And p. 23. he says, That the greatest perpendicular height between the two seas cannot be reckoned more than a hundred and forty-five feet, and may be from five to ten feet less. By a survey made by one Mr Gordon in 1723, he made the greatest height but a hundred and thirty feet; so probably Mr Smeaton's lowest calculation is just.

The consideration of what is above said by Mr Smeaton, a gentleman of equal ability with any perhaps in Europe of his profession, and who instead of being sanguine, is known to be rather extremely cautious and diffident in his plans and calculations, struck me exceedingly. I am of opinion, that the due consideration of it must awaken the public spirit of every lover of his country, who has any skill in commercial matters. I consider that an open and free communication between the two seas cannot fail of being productive of the greatest general national advantages, in regard to commerce, manufactures, fisheries, and agriculture. I suppose always, that this canal should be able to convey, not only lighters between the heads of the two friths, but also such vessels as are fit to navigate through the open friths themselves, and occasionally coast-wise, on both sides of the island, or to Ireland, and even to and from the coast of Holland and

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Germany, without being subject to the delays, the expence, and numerous inconveniencies of transshippings, and lodging of goods, which would be the case, if the navigation was to be carried on by different lighters only in a small canal.

I could therefore no longer doubt of the great impropriety of a small canal, which would occupy the ground and water necessary for a large one, and render it for ever impracticable. If I had entertained the least doubt in this matter, two other circumstances, unknown at first, were sufficient, on recollection, to have determined me, or any person who wishes well to his country, against the small navigation.

The *first* was, That they intended to begin the small canal a great deal too far up the river Carron to answer any general utility.

*2dly*, The gentlemen concerned in the intended small canal, according to my information, did, in the house of Commons, violently oppose the junction of a canal from Borrowstounness with theirs; though nothing is more obvious to common sense, than that the principal canal itself, with a view to general utility, ought to begin at or near Borrowstounness, and have branches only from Carron, because the navigation up that river is tedious, and often uncertain, on account of land-floods, and of shallow water in neap-tides, even for very small vessels. This is so true, that it would often happen, that a vessel entering through Borrowstounness, might be in Clyde, before another lying in the mouth of Carron could reach the intended junction of the canal in that river. There is water at Borrowstounness almost at all neaps, as I am informed, for ships of 2 or 300 tuns, and safe lying. On the other hand, it is difficult for vessels even of 30 or 40 tuns to get up in neap-tides to Carron-shore, above which the canal was to begin.

I do not mean to reflect on the gentlemen concerned, for their endeavours in these two points, nor for the precipitancy with which they have drove on the whole affair. Self-interest is the greatest principle in human affairs; it is the chief mover in trade, and the great source of improvements in it and manufactures: but I, and every one unconcerned in the small canal, must stand justified in vigorously opposing a plan tending so directly to a monopoly; nay, it is the duty of every well-wisher of his country to do so.

A great deal has been wrote in the public papers upon the question, Whether a great or a small canal would be most for the advantage of the country? The question, to any person who will take the trouble of considering it, is so clear in favour of the large communication, that no man of knowledge in these matters, unless warped by some private consideration, can have a minute's doubt of it. In compliance, however, with your Lordship's desire, I shall endeavour, shortly, to compare them together, and to obviate the chief arguments used in favour of the lesser canal.

The gentlemens chief arguments in favour of the small canal, are contained in a paper published in the Mercury of 30th March, the writer of which asserts, That 10,000 tuns annually is the whole quantity of goods that pass at present between the heads of the two friths; and that nine tenths of this quantity, or what may afterwards pass the canal, must go to or come from Glasgow.

This they urge as a strong argument in favour of the small canal; but it will be shown, that it is an egregious mistake. No person has a greater respect for the city of Glasgow than I. All Scotland is greatly obliged to her. The good influences of her foreign trade extend to every corner of it. Her banks have been useful to its manufactures and improvements, and her merchants are an honour to the country. Every trading town should endeavour to imitate her spirit and industry. Every good Scotchman ought to wish well to her trade; and instead of doing any thing to hurt, he ought to promote it when in his power.

An ill-judged notion, however, regarding the interest or importance of this particular city, opulent and respectable as she is in North Britain, can be no reason for hindering, or for preventing in all time coming, a scheme so highly beneficial to the interest of the three kingdoms.

It may be true, though it is doubted, that nine tenths of the present goods passing between the heads of the two friths, do go to or come from Glasgow. But why is it so? Because this city is the centre of the roads leading into Ayr, Renfrewshire, and the upper parts of Clydesdale, perhaps also to Dumbarton and Argyleshire. It has the only bridge over Clyde, below Bothwell, and the only navigation down the river. But if the great canal is established to enter at the Barns of Clyde, I think it probable, that in a few years after proper vessels are provided for such navigation, 20 to 25,000 tuns of goods may pass yearly through that chan-

nel, yet one half of the quantity will never come or go by water from Glasgow.

There will be a considerable addition indeed in the article of iron, foreign wood, flax, and other bulky articles, to Glasgow; because the freights to Borrowstounness or Carron will be much cheaper than to Port Glasgow; and the conveyance by the canal will be no great addition of expence, as these goods are at present brought up by lighters in Clyde: but great quantities of ungrinded corn, even for the consumption of that city itself, such as wheat, pease, oats, and even barley, not for malting, will go directly from the nearest parts of the canal to the different mills, which I am informed are chiefly on the river Kelvin. The quantities also which at present pass by the bridge, or by water-carriage, for all places down the river to the west and north-west of Glasgow, will never come near that city. Let no person fancy, that these quantities will be inconsiderable. I maintain, that the towns and country on both sides of the frith of Clyde below Glasgow will take off much more grain and meal from the east country by water than that city itself. The writer above mentioned will surely be of my opinion, as he informs us the improvements in agriculture have of late been so great round Glasgow; which is not, nor from the soil can be the case in the district west and north-west of it.

It will be obvious, without any further explication, that most of all the other goods, especially of the bulky coarse kind, passing or repassing between the two friths, or the different coasts, must take the same course, supposing them even the property of the inhabitants of Glasgow, unless so far as they are of the manufacture of that city, or for consumption or re-assortment in it.

If the comparison is to be made from the value of the goods carried, it will no doubt be much more in favour of Glasgow: but that is of no consequence in the present argument regarding tunnage.

It is therefore most probable, that, instead of nine tenths of the tunnage, one half of the quantity carried by the large canal will never touch Glasgow. I maintain, however, that a communication with the canal from Glasgow, fit to carry vessels of forty tuns, or upwards, by the shortest and easiest method that can be devised, is absolutely necessary; and without this the scheme will in no degree be complete.

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The delay, the expence, and other numerous inconveniencies of frequent reshippings, and often of lodging the goods at the different ends of the small canal, will be saved mostly by the large one. People in trade know what great attention is necessary in regard to these circumstances, upon bulky coarse goods, which cannot bear high charges.

The gentlemen for the small navigation have estimated the charge of reshipping, &c. of goods in Carron at 6 d. *per tun*, in the Mercury of 28th February. A writer on the other side, in that paper, of the 23d March, has estimated it at 2 s. *per tun*. I believe they are both wrong for the general run of goods: but if we take in all circumstances, and particularly the difference of freight, it will be found, that goods will pass very considerably, perhaps in general at above one half lower expence through the great than by the small canal. Many instances might be given; a few only shall be mentioned, in the great article of corn, which of necessity must at all times be the largest, and will apply in a great measure to most other bulky goods.

It should always be kept in mind, that bulky coarse goods are the great object in inland navigations; for high freight, or even land-carriage, can be afforded on fine goods, because it bears no proportion to the value; but in coarse goods, it is often, for a very short navigation, equal to one fourth, or one half of the value, and sometimes more than the prime cost of them.

Supposing then a small vessel to load grain at Alloa, Kirkaldy, Leith, or Berwick, intended for the consumption of Greenock, Campbeltoun, or any place west of Glasgow; the freight from the port of shipping to Carron, which by the way is generally dearer than to Borrowstounnes, we shall suppose 3 s. *per tun*; the expence of dues, mettage, pilotage, and re-shipping there, 1 s. 3 d. *per tun*; freight and lockage through the canal, 6 s.; charges of re-shipping at Glasgow, 1 s. 3 d.; and freight down the river, 3 s.; in all 14 s. 6 d. *per tun*. To this may be added, two additional customhouse-dispatches, and probably coast-bonds, besides the one granted at the original place of shipping; the expence and great trouble of which people in trade well know. If the vessel is large, and requires different lighters, or if they cannot be had exactly to contain the quantity of her lading, there may be several different customhouse-dispatches and bonds to be granted upon one lading at each end of the canal, and probably some part of the lading

lading to be lodged in granaries, from the tunnage of the lighters and that of the vessel that brings it not agreeing. There is further the great delay, loss of measure, and risk, by embezzlement and otherwise, from wet weather, &c. by shipping in so many different vessels, and under the charge of persons unknown, where the goods are not under the owner's eye: whereas if the corn is put on board of vessels from twenty to thirty, or forty tuns, there can be no doubt but they will go clear through to the port of delivery, for 10 or 11 s. *per tun* freight in all. This will be obvious to people in trade, who know, that when a vessel is once loaded, the difference of proceeding forty or fifty miles further makes little, or often no addition to freight in any staple article, the trouble and loss of time in discharging being the same at the near as at the distant port.

There is another circumstance perhaps not generally known, but an undoubted fact, That most kinds of grain will lose one *per cent.* by breakage, every time it is measured. Corn, carried as above, must be twice measured; once at each end of the small canal; the loss thereby alone will be at least 2 s. *per tun* to the owner. I can therefore appeal to any merchant acquainted in this trade, whether the difference in reality, taking the difficulty likewise of insurance in so many different bottoms, and the trouble of employing two additional factors for overfeeing the transhipping and freighting vessels, with many other circumstances which I may have omitted, would not in effect be 6 or 7 s. *per tun*; or, in other words, 60 or 70 *per cent.* dearer of freight, if passing through the small one, than it would be by the great canal.

It will be obvious also, that the same vessel, going clean through by Borrowstounness, may be often at her port of discharge, before another to reship at Carron could have her lading discharged; and dispatch is the life of the corn-trade. It may be observed further, that in this calculation it is not supposed that the corn is lodged, and again to be measured over, either at Carron or Glasgow; that will however happen often, for want of proper lighters or other vessels ready, or from other circumstances; and whenever that is the case, even but for a single night, I maintain, that it can be carried cheaper round by the Orkneys than by the small canal. Perhaps, without lodging, this will be found the proprietor's interest in all cases, when two additional vessels must be employed.

If Barley is shipped at Culross or Kincardine, as may often happen, for the supply, for example, of Renfrew, or Paisley, there will be three different shippings, and customhouse-dispatches, and bonds; nay, perhaps, four or five of these, if the size of the lighters do not coincide with that of the coasting vessel; with the charges, delays, and risks, attending such matters; and all this for a conveyance of twenty-five or thirty miles. It is submitted, if any thing more absurd can be thought of in the contrivance of a new general navigation for the benefit of a country. Such a strange manœuvre, by a narrow canal, might indeed be beneficial to the owners of the navigation, lighters, and warehouses; but surely can never tend to bring coarse bulky goods cheap to the consumer. It is therefore amazing, that the gentlemen concerned in that canal should have asserted, that an encouragement from government to the large one, would have been throwing away public money, because theirs would answer equally well for all the purposes of trade.

The gentlemen and others who very properly wish corn cheaper on the west side of Scotland, for the sake of manufacturers and labourers, are earnestly intreated to consider well what is above said, and in no degree exaggerated, and judge thereby which of the canals is most likely to answer that desirable end.

I beg your Lordship's patience in another instance or two. The case is so strong, though, perhaps, unknown to people out of trade; in regard to the expence of lodging or lightering bulky goods, and so little attended to in many parts of Britain, by people even in trade, I maintain, that any person shipping barley, for example, just now at Prestonpans, landing it at Musselburgh harbour, and reshipping it again for Leith, where the whole distance is only six miles, shall bring barley for the same expence of freight from London to Leith. If barley again is shipped at Berwick, landed at Leith, and reshipped again for Queensferry, I maintain, that it can be brought from London, directly to Queensferry, at 4 d. or 6 d. per boll cheaper.

In former years I have had occasion to send large quantities of bulky goods to London, and I have seen the way of managing them there. It appears to me, that, besides the great conveniency and dispatch of business, an amazing annual sum might be saved to the public, over and above the necessary interest of the money laid out, by making proper quays and conveniences there for landing coals, wood, corn, or such bulky goods, directly to the

warehouses or carriages, without the expence and other bad consequences attending double labourage and lighterage. The flatness of the ground would admit of this; and I think a remedy would have been applied long ago, in the like situation, by our neighbours the Dutch, who are particularly attentive to the saving of all possible charges on bulky goods. I write this, however, with great deference to those who are more immediately concerned in it, and under the correction of their superior judgement and experience, begging your Lordship's pardon also for the digression.

The same arguments will apply in a lesser degree to all corn shipped for the consumption of the city of Glasgow itself, and with little variation upon all bulky goods shipped in the same manner by different vessels from any of the two different friths or coasts for the other. The city of Glasgow ought in particular to attend to this, as it will always have more interest than any other single place in the navigation.

It is said, a proposal was made some years ago from Glasgow, that the mails to and from the countries beyond them should stop all the Sundays there in passing and repassing, for fear of disturbing that city, and because the correspondence farther off was, comparatively with theirs, of little consequence. This was passed from; and it is hoped that they will give up the present scheme of obliging all the corn, and other bulky goods, for the consumption of the country to the westward of Glasgow, to pass through their city. By this means their poor neighbours may have the corn 10 d. or 12 d. a-boll cheaper, and their own manufacturers and poor may have it 6 d. or 8 d. a-boll cheaper.

I hope I shall be excused for the above minute and tedious detail in regard to bulky goods; because I thought it of capital importance, and indeed decisive in the comparison regarding utility between the two canals.

The other arguments used for the small canal are, That the different ports will not be able to furnish ladings frequently and periodically for the larger kind of vessels; and that it would be difficult to get a number of such proper vessels constructed; and though they might pass the canal, they would not afterwards be fit for navigating in the two friths, or along the coasts.

In answer to this I say, There can be no doubt of the different ports furnishing ladings frequently and periodically in regard to staple articles.—The general run of the coasting-trade within

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the two friths and the neighbouring coasts being carried on by vessels from 30 to 40 and 60 tuns, but chiefly by those of the smaller kind; some of these, from their draught of water, would pass the canal; and there can be no doubt, but numbers of proper vessels will be soon constructed from 20 to 30 and 50 tuns burden, fit for the canal-navigation, as well as that of the friths and open seas.

The large corn-trade between Suffolk, Essex, Kent, and part of Norfolk, with London, is chiefly carried on by such vessels, as well as the great trade between that city and the many branches of the rivers above Hull, where the navigation is supposed to be more difficult, on account of shallows, streams, and land-floods, than in a canal. It is also well known, that the Clyde galberts go to all parts of the highland coast and islands, and to that of Air and Galloway; I believe also to Ireland. The King-horn passage-boats, which are 40 tuns burden, go in the same manner to Aberdeen and the Murray-frith. We frequently see such English vessels from the Yorkshire rivers at Leith; and many Dutch vessels which navigate in their canals, in our own and the English ports very often. Such Dutch vessels of large burden, by means of their lee-boards, trade every year to the Baltic and France. Our people surely have ingenuity enough to avail themselves of lee-boards as well as the Dutch; and consequently can pass the canal, and navigate afterwards to as great a distance as they. Should this still be doubted, government can, and I hope will give aid to make the canal of such a size and depth as to enable vessels of an ordinary construction, and fit to navigate at all times, and in every sea, to pass through it freely.

The argument used in regard to the annual saving to the public is fallacious. I think the calculations ill founded, as the land-carriage is over-rated; and that the savings to the public on the L. 10,000 supposed to be paid for land-carriage on 10,000 tuns of goods, will not be near L. 7000 annually. Be that as it will, upon their own argument, it is all in favour of the large canal; because an infinitely greater quantity of goods, especially of the bulky coarse kind, must pass by the one than by the other, and the annual savings to the public must be in proportion to the quantities that do pass.

The great and capital objection still remains, and which indeed would be unanswerable if it was true, *viz.* That if we do not

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take this small navigation, we can never get the great one, because of the large sum it will require for the execution, and the improbability of receiving any public aid for that purpose, when no money has been given for inland navigations in England.

I could give a short and solid answer to this, by saying, That I think it is obvious from what is before mentioned, that it would be more the interest of the public to take the great canal with  $2\frac{1}{2}$  d. or 3 d. a tun lockage *per mile*, than the small one at 2 d. *per tun*; and as I doubt not but one half more goods would pass by the one than what could possibly pass by the other, we would thereby have a better fund for the execution of the large canal than they would have for the small one. But as I am of opinion the lockage either way is too high even at 2 d. I shall drop that argument.

The gentlemen concerned, from what they themselves advanced at the meeting in the session-house on the 3d of April, and which was in effect but a recapitulation of their paper in the Mercury of March 30. have furnished sufficient arguments to shew, that the scheme will nearly execute, at their rate of lockage, though no aid was to be had from government, but which I firmly believe neither ought or will be refused.

In the above-mentioned paper it is said, That 10,000 tuns is the utmost amount of the goods carried at present to and from Glasgow and the neighbourhood with the upper parts of the frith of Forth. It would be easy to shew from their own words, and otherwise, that this quantity is greatly under-rated. But supposing their calculation just, they say, that a toll of 2 d. *per tun, per mile*, on 10,000 tuns, will yield an interest to the adventurers nearly equal to 4 *per cent.*; and that if the quantity should increase to 20,000 tuns, it will yield an interest of near 10 *per cent.* on a capital of L. 40,000. Now, we are to suppose these gentlemen are well founded in their calculations, and an interest of 10 *per cent.* on L. 40,000 is equal to 5 *per cent.* on L. 80,000, the amount of Mr Smeaton's estimate; a pretty rational ground for people to embark on, especially in a project so much for the good of their country. In another part of this paper, it is said, that about 6000 tuns of grain are brought to Glasgow annually, for the consumption of that city and neighbourhood, from Borrowstounness, Carron, Alloa, &c; and the writer is pleased to say, that article will not increase, but rather diminish; that no wheat or flour will be carried through the canal, because that by the late improvements

provements in agriculture, the growth of wheat about Glasgow is now become equal, or nearly so, to the consumption.

True it is the culture of wheat increases in that district; and the crops of it in the west country were much better in proportion the two or three last years, but especially the last, than they were in England, or perhaps in the south-east parts of Scotland. Flour has, however, according to my information, continued to be carried every week from the Edinburgh mills to Glasgow and the neighbourhood through this winter and spring by land. The writer, I believe, is also misinformed, in asserting that wheat was, when he wrote, cheaper at Glasgow than in any other part of Britain; and if there are not large supplies to Clyde from the Baltic or America before harvest, he will probably have reason to alter his whole opinion.

Every improvement made in agriculture must be agreeable to all well-wishers to their country; but it may be observed, that the consumption of wheat, and of oats for horses, increases daily about Glasgow; and that if more land is occupied in wheat, there will be the less for other grain; so it will occasion little difference in the whole quantity of grain and meal carried by the canal. But whatever improvements are made on the west side of Scotland, it is not to be expected, from the soil, climate, and other circumstances, that they will ever be able to raise a sufficient growth for their consumption, if their trade and manufactures continue to go on: perhaps it would be even a loss to that part of the country, if they did so. No doubt, however, but the quantities wanted will fluctuate greatly in different seasons.

If there be 6000 tuns of corn carried at present by land, it is obvious, that 10,000 tuns, at least, must, *communibus annis*, pass by the canal in future; for those who have access by the canal will have greatly the advantage of people from the west end of Stirlingshire, Linlithgowshire, the head of Clydesdale, Peebles, and Teviotdale, who have long land-carriages. Great additional quantities also of barley, pease, wheat, oat-meal, and oats, for the consumption of Glasgow, and for both the lower sides of the Clyde, and Ayrshire, which at present go through the British channel, or by the Orkneys, will undoubtedly pass that way, as well as great quantities of the coarse goods, which pass at present between Edinburgh and Glasgow by land-carriage.

It does not appear, if, in their calculation of the 6000 tuns,

they have reckoned on the growth of corn about the town of Stirling, and part of Clackmannan and Linlithgow shires, which go by that road: most probably they have not. Those quantities are known to be considerable, and a good deal also from the intermediate country between Falkirk and Glasgow; all which will go mostly by the canal, or at least pass some part of it, and must greatly increase the quantity.

I believe, that in a little time, after proper vessels are constructed for the navigation, 20 to 25,000 tuns will pass through the great canal yearly.

The corn above mentioned, foreign wood, flax, hemp, iron, salt, and liquors, will be capital articles, as well as the great variety of London and other English goods; lime or limestone will be very considerable for the first eight or ten miles westward from Borrowstounness, and the same possibly near Glasgow, though of this I am not certain; coals, stones for building or paving, ores, and home-wood, household-furniture, hay, straw, roots, dung, and in time even goods for fairs, passengers, and many other things which cannot now be thought of, may be great articles to both sides of the canal, with and from the intermediate country through which it passes.

From the Clyde side, the commodities from the west of England and Ireland, bark, oak, wood, kelp, slates, ashes, fish, lead, and many other articles, besides the productions of America, rum, mahogany, staves, wood, tar, pitch, turpentine, lintseed, cotton, &c. which are bulky articles, must be a great amount. Great quantities of tobacco, rice, and raw sugar, for Holland, Germany, &c. especially in time of war, will undoubtedly pass through this canal, if it be made fit for large vessels: and other foreign bulky articles will come in return, such as, wainscot, ashes, lintseed, flax, ship-plank and timber, coarse linen, Osnaburgs, rags, &c. I am aware, that, as the law now stands, there are difficulties in regard to tobacco and salt passing; but these can be easily corrected by a new statute, the alteration being so much for the public utility.

There is then the greatest reason to believe, that about 25,000 tuns in a few years will pass between the two friths; and in time of war with France, or other northern powers, perhaps a good deal more. If 25,000 tuns pass, it will be equal to an interest of

$12\frac{1}{2}$  per cent. upon L. 40,000, or about 5 per cent. on L. 100,000, without increasing the lock-duty proposed upon the small canal.

Some allowance, however, should perhaps be made for interruptions of the navigation by frosts, and at times by accidents to locks, or by land-floods, in which times considerable quantities of corn and other goods, which could not admit of delay, would undoubtedly go by land-carriage. Somewhat also, perhaps, may be reckoned for under-rating of the tunnage of vessels, as usual. I believe, in such cases, I would reckon also, that it may cost L. 100,000 fully to complete Mr Smeaton's plan, beginning at Borrowstounness and ending at the Barns of Clyde, with proper branches to Glasgow and Carron; both which I reckon indispensably necessary.

In this state of the case, it will scarcely be practicable to execute the large canal at 2 d. a-tun *per* mile lock-duty; and I have already said, that this rate of duty is too high. Aid, however, will, I trust, be got from the public, for reasons to be after mentioned, such as will enable the lock-duty to be lowered to 1 d. or  $1\frac{1}{2}$  d. *per* tun; and though no certainty of this can be obtained beforehand, I doubt not, but a subfcription will fill on the reasonable prospect of it.

I have reason to believe this; because, when a few gentlemen in Glasgow, with one or two from Carron, signed L. 40,000 for the small canal, I doubt not but many other opulent traders in that city will take shares in the large one. This is the more likely, since, by accident, many of them were not adventurers in the other, and, if my information is right, to their great disappointment.

The city of Edinburgh, we are told, took L. 100 only of the last subfcription. Even that sum was by a Dumbarton land-holder. This is not to be wondered at; for, I believe, it was not intended that they should have any share; and I am informed, that none here ever saw the plan or estimates before the subfcription was closed: but surely there is ability enough, and I hope spirit also, in this place, for a large share. I cannot doubt also, but many noblemen and gentlemen of fortune, and traders, in various parts of this country, as well as in England, will take shares in the adventure, seeing it is so much for the benefit of the united kingdom, and promises also an adequate interest of money, if they have but a moderate

derate public aid, which I trust they will take their venture of.

The capital objection, then, as to the great canal, is, I hope, answered, seeing the navigation by it can, in any event, be carried on more profitably to the country, and at a lower lockage, if government assists, than by the small canal, to which the public surely would never have given any aid.

The other arguments in favour of the small canal deserve no notice; but I am of opinion, with the letter-writer in the Mercury of the 4th April, that notwithstanding of their intention, of imposing an improper scheme on us, the gentlemen who projected the small canal, deserve well of their country for that attempt, and for being the means, even by the precipitancy of it, of raising a spirit of inquiry, and attention to the promoting of a large and useful navigation. I think they ought to be repaid the expences they have laid out, and be intitled to shares in a new subscription, to a certain degree, preferably to any others, if they so incline.

But their plan for the entry of the canal from the frith of Forth should by no means be adopted. Borrowstounness, or somewhere near it, is undoubtedly the proper place for that purpose, as has been already shewn.

The ending the canal at Glasgow would be also very improper for the public, by reason of the shallowness of the Clyde for six miles below Glasgow. Perhaps it joins too far up the river, even at the Barns of Clyde. I am not sufficiently informed of this, nor have I time for the inquiry; but if it can enter the river farther down, where vessels of greater burden can come up, it surely ought to be so, though it should cost a great additional sum. It is humbly submitted to the gentlemen of Glasgow, who are best judges, whether, if it should enter lower down, where vessels of burden can come up, and the canal of communication from the Forth to Glasgow join there also, if it might not be a far preferable navigation to what the Clyde is at present between that place and Glasgow, and might not relieve them of the frequent stops of their river-navigation by floods and drought.

The additional distance from the frith of Forth is, I believe, of no consequence; and probably one or two locks at most would be sufficient between such entry and Glasgow.

If this should not be thought proper, or be impracticable, I would

would humbly propose, that the lock formerly projected by Mr Smeaton to be executed near the Barns, for the improvement of the navigation of Clyde, should now be made a part of this plan; and it will answer the double purpose of that improvement, and the junction with the Forth canal.

I could easily expatiate on the numerous advantages that may result from this noble plan, if properly executed, to various parts of the kingdom. A capital point will be, the easy and free access which both sides of the island will have to the fisheries on the opposite friths and coasts. These fisheries in former years have been known much larger on each side than the particular hands and vessels belonging to either separately could manage. This will not be the case in future, when the communication is made. The county of Northumberland is likely to reap the greatest advantage of any one, from the large quantities of corn it ships annually; and in Scotland, those of Berwick and Argyle seem to me most likely to have the greatest benefit. But of all towns, Glasgow will have perhaps the most permanent, and certainly the most immediate benefit, by her getting corn and other bulky goods so much cheaper, and by having the whole east-country trade opened to her, the advantages of which she has the knowledge, the means, and the spirit, to avail herself of.

Upon the whole, I would humbly propose, that if the gentlemen concerned in the small canal should not immediately drop their bill, that it should be vigorously opposed by petitions from all quarters; and that the petitioners should apply to be heard by counsel in either or both houses of parliament till it is set aside.

When that is done, the best advice should be taken from Mr Brindley and others that are thought proper. Mr Smeaton in particular should be brought down again, to make a new survey and estimate for a canal, to enter at or near Borrowstounness, and to end at any proper place at or below the Barns of Clyde, where vessels of burden can come up, and lie at all times with safety; that it have a branch from the most convenient place to the city of Glasgow, and one or more with the river Carron. The lower down it enters there, at least so far as vessels of burden can come up to at all times, I apprehend it will be the better, both for the public, and the proprietors on that river; because in the goods to come or go by large vessels, some lighterage, &c. with the warehouses,

may be saved. As to that part of the trade lying higher up the river, if one communication should only be made, the difficulty of navigating to or from the canal for so small a distance, will not, I suppose, be of any consequence.

The situation of North Britain, my Lord, is particularly remote, and detached from the rest of the world. The east coast of the whole island, from London to the Murray-frith, has no sea-communication with the west side or with Ireland, but by a tedious and dangerous navigation through the channel, or by the Orkneys.

The west side, again, and Ireland, has no communication with the east side of the island, or the northern parts of Europe, but through these tedious and dangerous navigations. The country of Scotland is also mountainous and impassable in many places, especially from east to west; and nature has in general deprived us of the benefit of inland navigations, so beneficial to other countries. These circumstances have undoubtedly long retarded our progress in trade, manufactures, agriculture, and other improvements. Bounteous nature has however afforded the means of the inland navigation now in question; and a most beneficial one it may be, if we know how to make the proper use of it. Let no local or private considerations, regarding particular persons or communities, prevent us.

Changes and revolutions in trade will no doubt be made in time, by the new communication, to the hurt of some, and benefit of other places: what or where these may be, no man alive can say, with any degree of certainty, at present; but every one must see, that it will be a great benefit to the three kingdoms in general. Let no person, therefore, who wishes well to his country, neglect the present opportunity of cherishing the spirit and ardour that prevails on this head. Let us all unite, and endeavour to have the communication executed upon the most liberal and beneficial plan. Let subscriptions be opened at Edinburgh, Glasgow, and elsewhere, for that purpose, for raising a sufficient sum, taking the risk on us of an aid from the public: more, I doubt not, will be subscribed than needful; and the adventurers may have a share, each in proportion to his subscription. Let the lockage be lower, if possible, than is proposed, and let the canal be made capable of admitting vessels of sixty tuns, or upwards, if that be practicable.

Let our representatives, and others, apply boldly, because justly, for an aid of public money for enabling us to execute the work

work to purpose, and in a manner becoming the honour of the British nation, as well as for the general benefit of it. Let no man be afraid that our most gracious sovereign, and the wise parliament of this queen of trading nations, will ever refuse the insignificant sum of L. 40 or 50,000, (I call it so in respect of the object), when to be applied to so valuable a national purpose.

I can have no doubt of our success, when I consider, that the whole east and west, as well as the inland counties of England north of Dover, and also the kingdom of Ireland, have as much interest in this matter as we, tho' locally not so nearly situated to the canal: perhaps they have more interest; because they are richer, and more engaged in trade and manufactures; for the people living near, or on the side of a bridge, road, streight, or sea-passage, have often less interest in them than those living at a distance, of which many instances might be given.

Who does not see, that the commodities of London, Hull, Newcastle, and all the adjacent towns and country, can safely and commodiously pass this way, especially in time of war, for the west of Scotland, north-west of England, and the north of Ireland? 30 or 40,000 quarters of grain alone from the east coast of England will pass through it one year with another for the consumption of Scotland, and a great deal more when there is a demand to the north of Ireland or north-west of England. The west of England, and all Ireland, will have the same benefit for their commodities with the east coast in return, and with all the northern continent of Europe. Goods may even pass and repass with America, and in the same small bottoms, if the canal is executed to purpose.

The improvement and civilizing of the highlands and islands of Scotland, will be greatly promoted by it. The communication with them, and with the forts and garrisons on the west of Britain, and in Ireland, will obviously be more free and easy; the supplying them with provisions, stores, &c. more cheap and certain; circumstances, especially in time of war or internal commotions, of no small moment.

Further, I cannot doubt of aid from the public, when I see daily such large sums laid out on bridges over the Thames and elsewhere, when government has lately made roads at a great charge from Newcastle to Carlisle, and from thence to Port Patrick, for a communication with Ireland, where the adjacent countries were not able for the

expence. When I consider also what aids are given every year for the settlement of new colonies, for the discovery of distant islands, for the encouraging of various particular branches of trade and manufacture, can I doubt of aid being given to so capital an improvement upon navigation itself, the support of all commerce and manufacture? That nothing has been hitherto given to inland navigations in England, is no argument against this; because every one of these, in respect of this, is *partial, local*, and adapted only to the trade and convenience of particular towns and districts: The one in question is a general navigation for Britain and Ireland.

I would ask any person acquainted with history, if he thinks the ancient Egyptians, Greeks, or Romans, if they had been acquainted with the use of locks, or the Chinese, the French, or the Dutch, would have so long neglected an opportunity furnished and pointed out by nature for so great an improvement of the commerce and police of their country?

The late French King expended above L. 600,000 Sterling on the canal of Languedoc, *situated in a country more remote from Paris than this is from London*, at a time when commerce was less understood, and when money was of more value. The navigation he opened was not, I think, of the same importance in respect to trade, and the communication far less useful than this will be; because it is capable only of inland lighters, and joins with rivers where the navigation is almost constantly interrupted by floods or shallows; ours will carry trading vessels, and join at both ends with the navigable tides, and it can be executed for about a sixth part of the expence.

I will therefore never allow myself to think, that the wise legislature of this free trading country will be less attentive to a great improvement in navigation, even in a remote part of the kingdom, than this despotic prince was. An ample and adequate sum becoming of the legislature, I doubt not, will be given. Whatever is obtained, the lockage should be decreased, in proportion to the sum given.

Perhaps the public, which would be most desireable of all, and most for the honour of the British empire, and of its administration, will execute the whole, and lay on a rate for lockage, equal only to the expence of keeping and repairs under proper direction. This I even hope may be the case, if it be represented to his most gracious

gracious Majesty, and the other branches of the legislature, in a proper manner. Funds even almost sufficient for this purpose might be pointed out within Scotland itself, without any new tax or incroachment on the revenue, and without hurting any other plan of public utility.

THAT every thing, my Lord, relating to this great national affair, will be properly represented, at such times, and in such manner, as it ought to be, I will not allow myself to doubt, when I consider the number of able patriots we have from this part of the united kingdom in the British senate, and in other public stations; when I see also a Noble Peer, the active and unwearied friend and cherisher of the infant manufactures and improvements of this his native country, and many other persons of great rank and eminence here, so zealous in this good cause.

I have the honour, &c.

Indicates strong side of gambar. Well you didn't try to take a  
shot at first, seems about on the same. Viscosity of air, speed  
of waves or current. When you throw a lead or a dart it is the current  
and wind speed to determine side. If you don't have visibility  
take a look at the water edge or rock which casting pole to just  
over surface and take a look at the air. If you have a parabolic  
shooting angle you should be able to throw the dart into the water  
and just. The visor has reduced certain air resistance to accomplish  
what you want in throwing a lead or a dart.